Model for Urban Forest Sustainability

Jim Clark
Nelda Matheny

Sustainable urban forest

- Overview

- 1995 Model

- New & novel ideas

Sustainability

U.S. EPA

(http://www.epa.gov/Sustainability)

"meeting the needs of the present without compromising the ability of future generations to meet their own needs."

The Sustainability Report

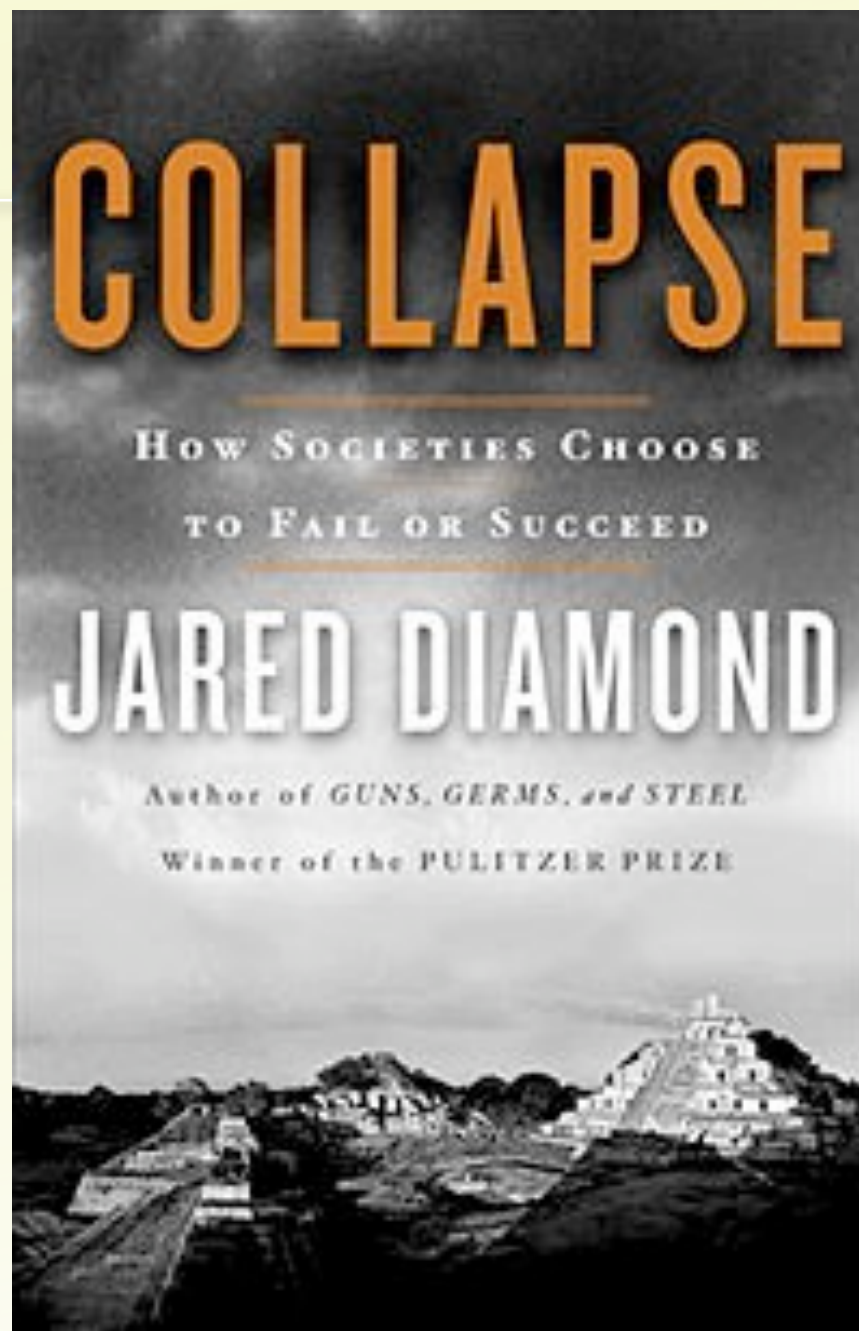(http://www.sustreport.org/)

" Sustainability is about living and working in ways that meet and integrate existing environmental, economic and social needs without compromising the well-being of

Sustainability

- Balance between current & future needs

- "….without compromising…"

Sustainability

- Balance between current & future needs

- Collect the interest on the natural capital but not endanger it.

Sustainability

- Sustained yield / harvest

Sustainability

- Pebble Mine project in Alaska: fishing or mining?

- "....metals are a finite discovery, the fish have replenished themselves for generations."

http://www.nytimes.com/2008/08/23/us/23alaska.html?_r=1&oref=slogin

William Yardley

Sustainability Indicators -- Canada

Canada's first independent initiative to find out how we are doing at living in balance for the long term. The reporting system works from a definition of sustainability that sees human activities as part of - and dependent upon - the natural world.

- Air quality: Ground-level ozone
- Freshwater quality: Government criteria
- Greenhouse gas: Emissions
- Forests: Cover
- Wetlands: Area
- Human capital: Education

www.sustreport.org/indicators/nrtee_esdi.html

Sustainability: the urban forest context?

Sustainable urban forest

- HortScience
- The Trust for Public Land / California Releaf
- U.S. Conference of Mayors

- National Urban & Community Forest Advisory Council

Sustainable urban forest

- Developed model
  - 17 criteria
  - 4 performance indicators

- Surveyed cities in the U.S.

Sustainable urban forest

"The naturally occurring and planted trees in cities which are managed to provide the inhabitants with a continuing level of economic, social, environmental, and ecological benefits today and into the future."

Sustainable urban forest

- Broad, general goal

- Benefits rather than goods

- Human intervention

- Trees on private land

San Francisco Parks
By Supervisor District

Supervisor District

Thursday, December 10, 2009

Sustainable urban forest

Sustainable urban forest

- Vegetation resource

- Canopy cover

- Age distribution

- Species diversity

- Native vegetation

Sustainable urban forest

- Community framework

- Public agency cooperation

- Private land–owners

- Green industry

- Neighborhood action

- Citizen – government – business interaction

- General awareness

- Regional cooperation

Sustainable urban forest

- Resource management

- Management plan
- Funding
- Staffing
- Assessment tools
- Protection
- Species & site selection
- Standards
- Safety
- Recycling

Sustainable urban forest

- Tree protection

- Indicators
  - None
  - Ordinance
  - All projects
  - Integrated planning

Sustainable urban forest

- City-wide management plan
- Indicators
  - No plan.
  - Plan limited in scope.
  - City -wide plan, accepted and implemented.
  - Comprehensive resource management plan

Sustainable urban forest

- Green & wood waste recycling

- Indicators
  - Simple disposal (i.e. land filling) of green waste.
  - Green waste recycling --public trees.
  - Green & wood waste recycling – public & private.
  - Closed system -- no

Sustainable urban forest

- Surveyed 25 U.S. cities

- Used model to "score" sustainability with 0 to 80 scale.

- Results:
  - Average -- 49
  - Range -- 27 to

Sustainable urban forest

- Surveyed 25 U.S. cities

- Used model to "score" sustainability with 0 to 80 scale.

- Results:
  - Average -- 49
  - Range --   27 to

- Highest
  - Community awareness
  - Neighborhood action

- Lowest
  - Interaction with private / institutional landowners
  - Regional cooperation

Sustainable urban forest

- NUCFAC 1995

- Developed & tested model
  - Criteria
  - Performance indicators
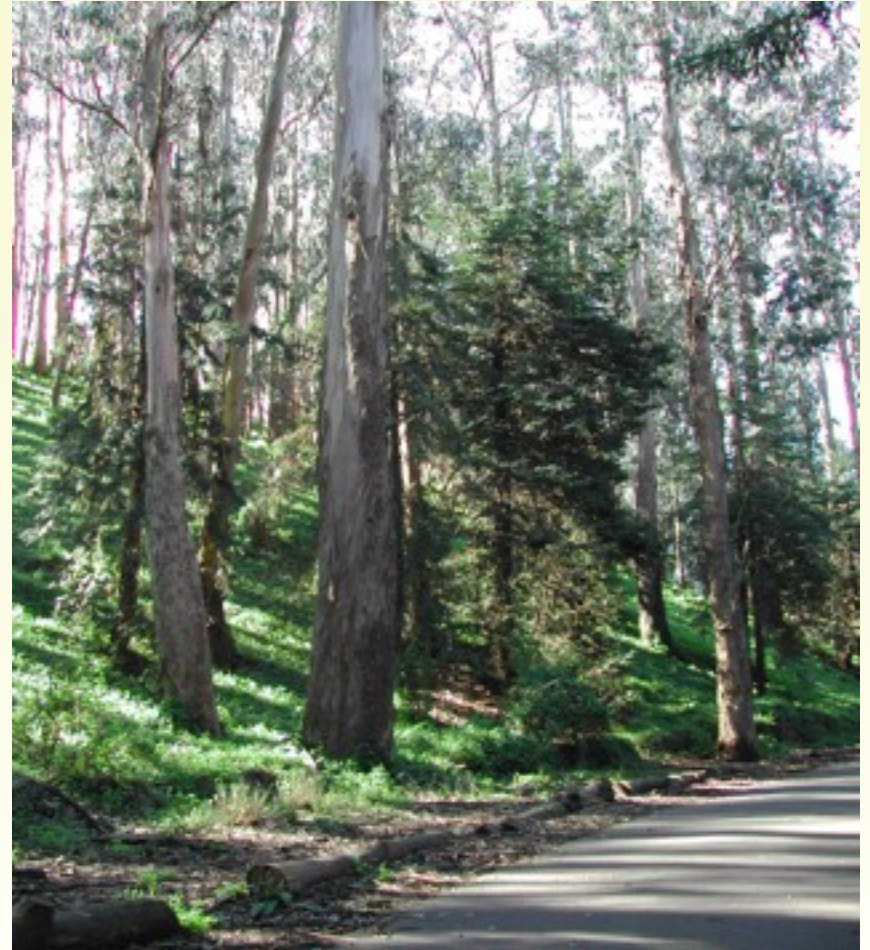
Sustainable urban forest

Are we able to recognize a sustainable urban forest?

Sustainable urban forest

- Sustainability is reflective

- Identify & measure criteria to establish base line

- Re-assess over time

Sustainable urban forest

- Sustainability is reflective
- Identify & measure criteria
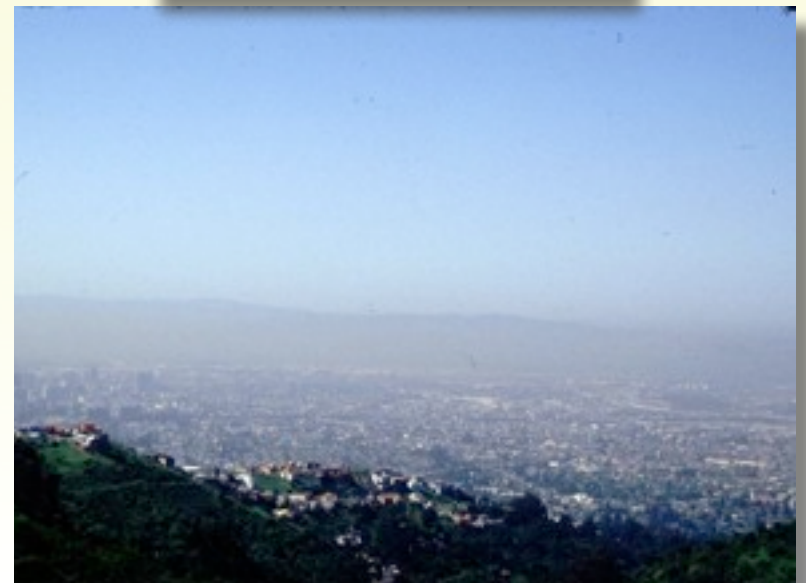- Re-assess over time

Establish links to other economic, social, ecosystem functions

Sustainable urban forest

- Ecosystem functions
  - Air and water quality
  - Water supply & regulation
  - Erosion & sediment control
  - Waste disposition & treatment
  - Carbon sequestration

Sustainable urban forest

- Links natural & built systems
  - balanced environmental, social and economic outcomes
- Improves quality of life & the long-term health
  - communities and the environment
- Balances the needs of people & the environment

Sustainable urban forest

City of Shoreline

Creating an
Environmentally
Sustainable Community

ICLEI Members Meeting

December 11th, 2008

Juniper Nammi, Associate Planner
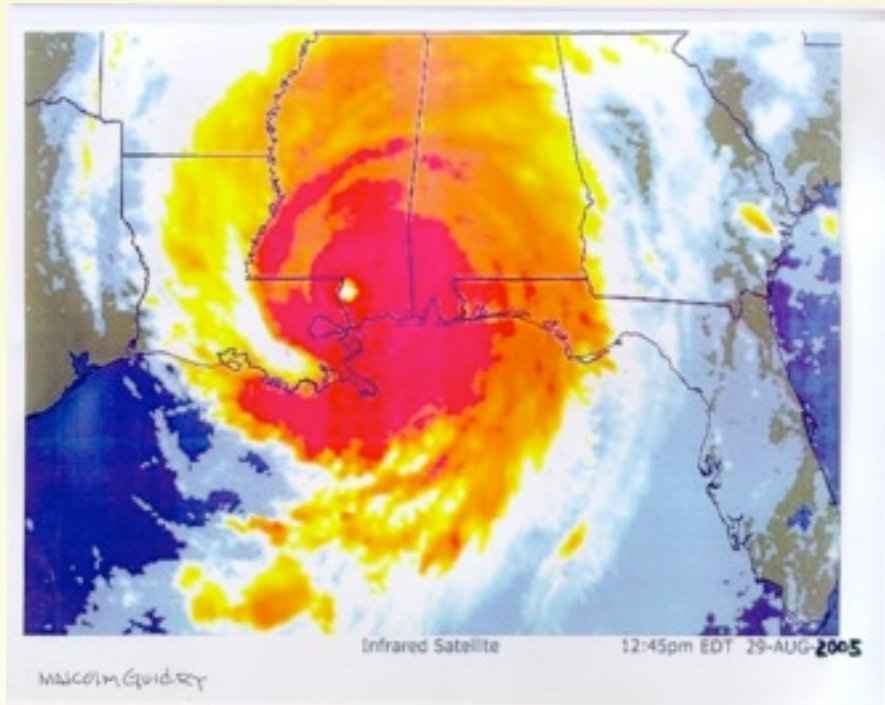**jnammi@shorelinewa.gov**
206-801-2525

Recent developments

- Urban forestry (UF)

- Urban & community forestry (UCF)

- Urban & peri-urban forestry & greening

Recent developments

Infrared Satellite   12:45pm EDT 29-AUG-2005
MALCOLM GUIDRY

- Disturbance as an element of urban forest management
  - Hurricane & tornado
  - Flooding
  - Snow & ice
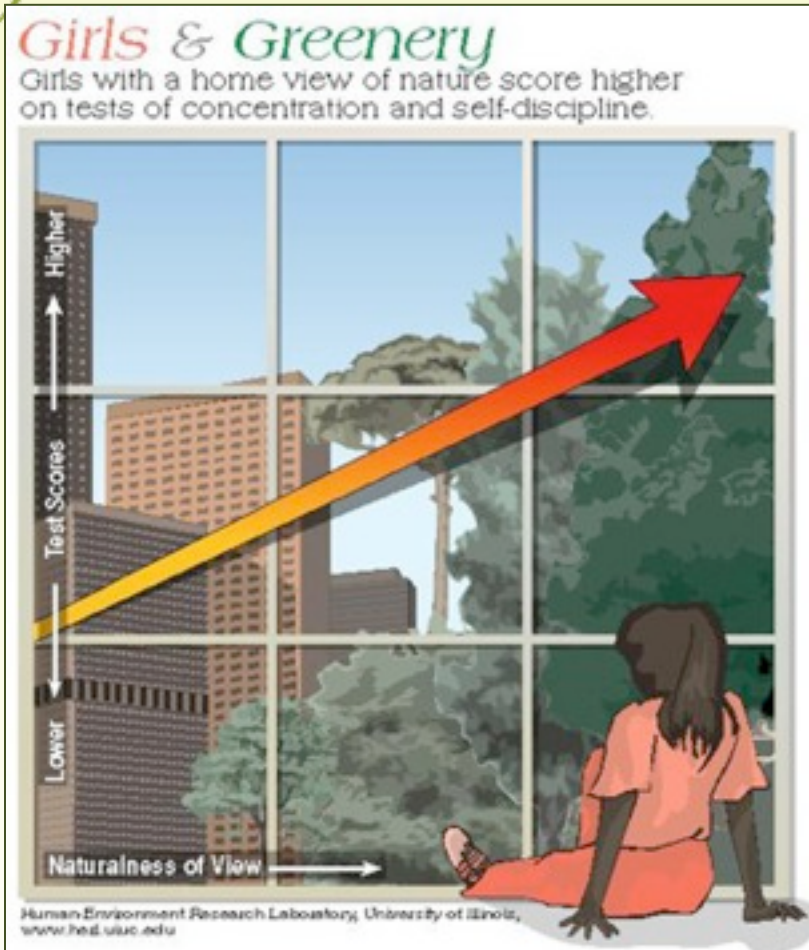 - Fire
  - Pest
  - Development

Recent developments

- Benefits of trees & urban forests

Physiological & social benefits

Univ. of Illinois, Landscape & Human Health
Laboratory.   www.lhhl.uiuc.edu/about.htm

Physiological & social benefits

- Kathy Wolf
  - University of Washington
  - www.naturewithin.info

- Impact of trees in retail business districts

Recent developments

- iTree

  - Suite of tree management software

  - USDA Forest Service & Davey Tree Expert Co.

  - PDA–based

  www.itreetools.org

Recent developments

- iTree

  - Eco (aka UFORE)

  - Streets (aka STRATUM)

  - Hydro (beta version)

  - Inventory & assessment tools

www.itreetools.org

Urban forest structure & function

Urban Forest Effects Model

http://www.ufore.org/

- Structure
- Contaminant removal
- VOC production
- Carbon sequestration
- Pest impact
- Compensatory values
- Allergenicity index

Recent development

	Atmospheric Contaminants	Annual Value (millions)	
Seattle	319	$1.57	
Portland	1280	$6.44	
Salt Lake City	774	$4.06	
San Francisco	276	$1.48	
	O_3, PM_{10}, NO_2, SO_2, CO		

Recent developments

- UFORE
  - City / region scale
  - Benefits directly tied to canopy cover
  - Not tied to specific location

i-Tree Streets -- Lake Merritt

i-Tree Streets –– Lake Merritt

	No.		Benefits				
		Energy	CO_2	Air quality	Storm	Other	Total
Existin	264	4,993	536	–546	1,590	22,866	29,438

i-Tree Streets -- Lake Merritt

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New							
At plantin	521	575	44	-75	118	22,234	22,986

i-Tree Streets –– Lake Merritt

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Existin	264	4,993	536	–546	1,590	22,866	29,438
New							
At plantin	521	575	44	–75	118	22,234	22,986
5 years	500	2,596	188	–191	491	30,109	33,193
20	450	7,206	632	–80	1,718	31,224	40,700

i–Tree Streets

- Streets
  - Developed for street & park trees

  - Species, size & placement

  - Overhead utility & sidewalk conflicts

Recent developments

- Greenprint Initiative

- Sacramento Tree Foundation

www.sactree.com

Recent developments

- Regional: Sacramento & adj. communities & counties

- 5 million trees

- Toolkit

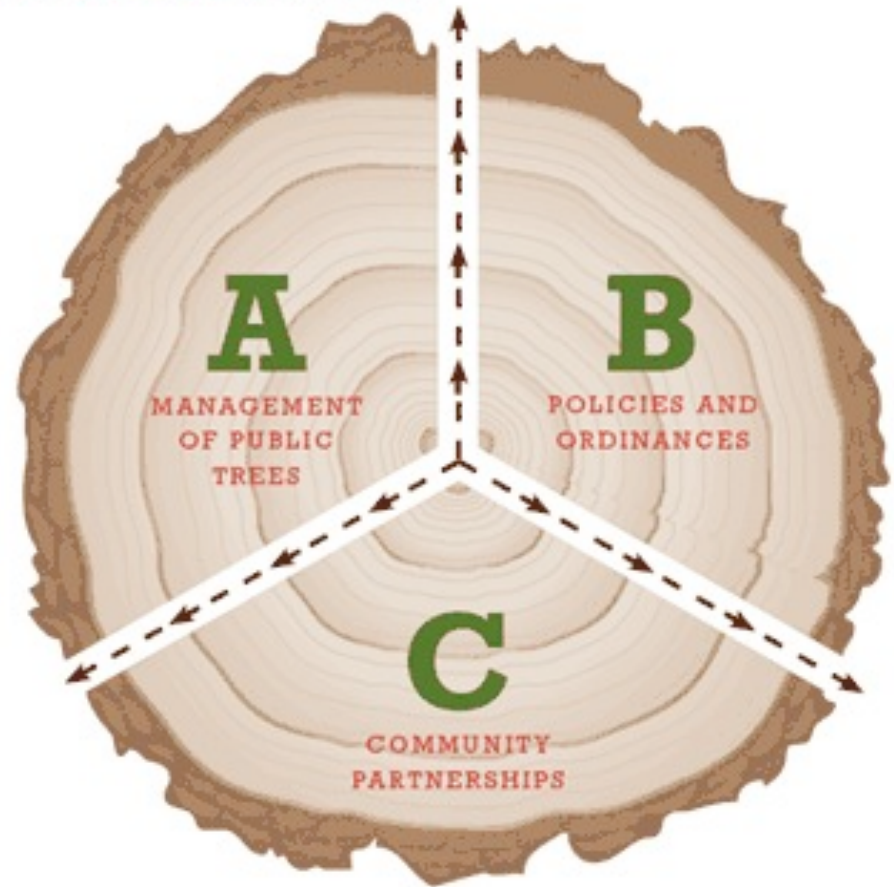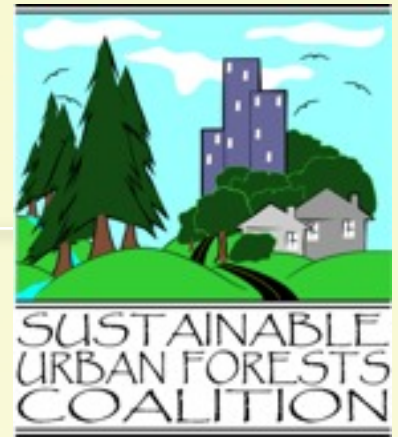# Recent developments

- Greenprint elements
  - Management of public trees

  - Policies & ordinances

  - Community participation

ELEMENTS OF THE GREENPRINT

A — MANAGEMENT OF PUBLIC TREES

B — POLICIES AND ORDINANCES

C — COMMUNITY PARTNERSHIPS

Recent developments

Sustainable Urban Forests Coalition

- Alliance for Community Trees
- American Forests
- American Nursery & Landscape Assoc.
- American Planning Assoc.
- American Public Works Assoc.
- American Society of Consulting Arborists
- American Society of Landscape Architects
- Davey Resource Group
- International City/County Management Assoc.

- International Society of Arboriculture
- Keep America Beautiful
- National Arbor Day Foundation
- National Assoc. Conservation Districts
- Society of American Foresters
- Society of Municipal Arborists
- Tree Care Industry Assoc.
- TreeLink
- Utility Arborists Assoc.
- National Assoc. State Foresters
- USDA Forest Service– Urban & Community Forestry Program

Recent developments

- LEED
- Leadership in Energy & Environmental Design

- U.S. Green Building Council

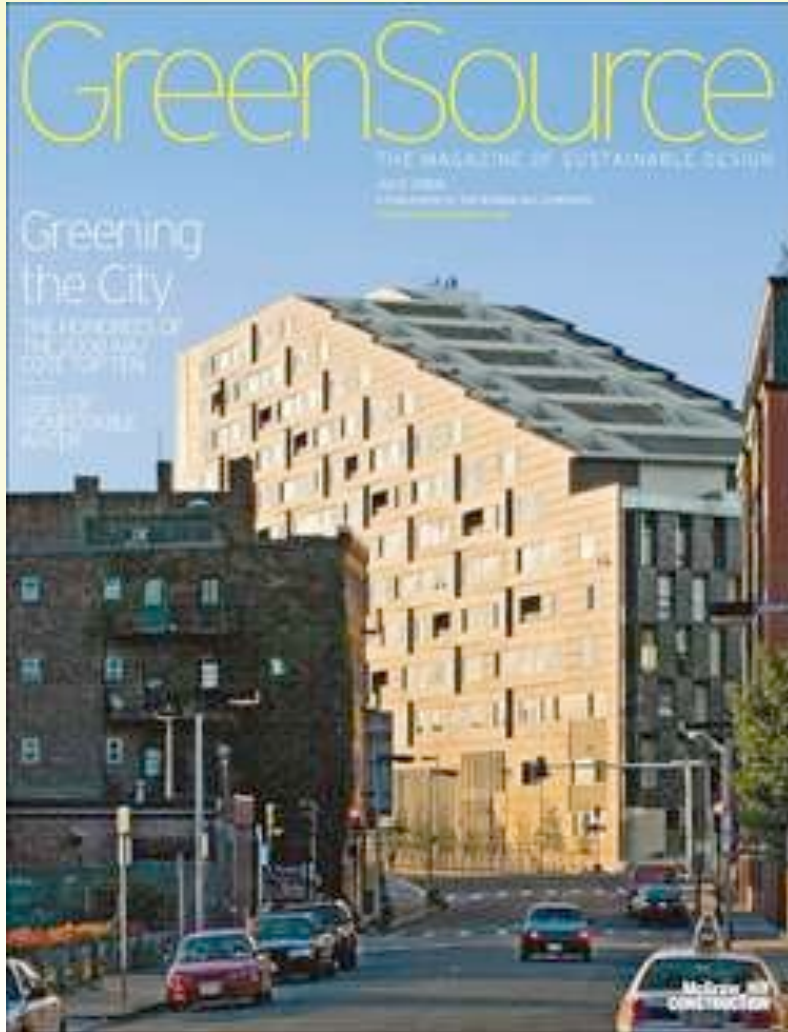- Origin: Natural Resources Defense

Recent developments

- LEED
- Leadership in Energy & Environmental Design

- U.S. Green Building Council

- Origin: Natural Resources Defense

- Green Building Rating system

- "…a suite of standards for environmentally sustainable construction."

Recent developments

- 14,000 projects in 50 states & 30 countries

- USGBC: 10,000 member organizations
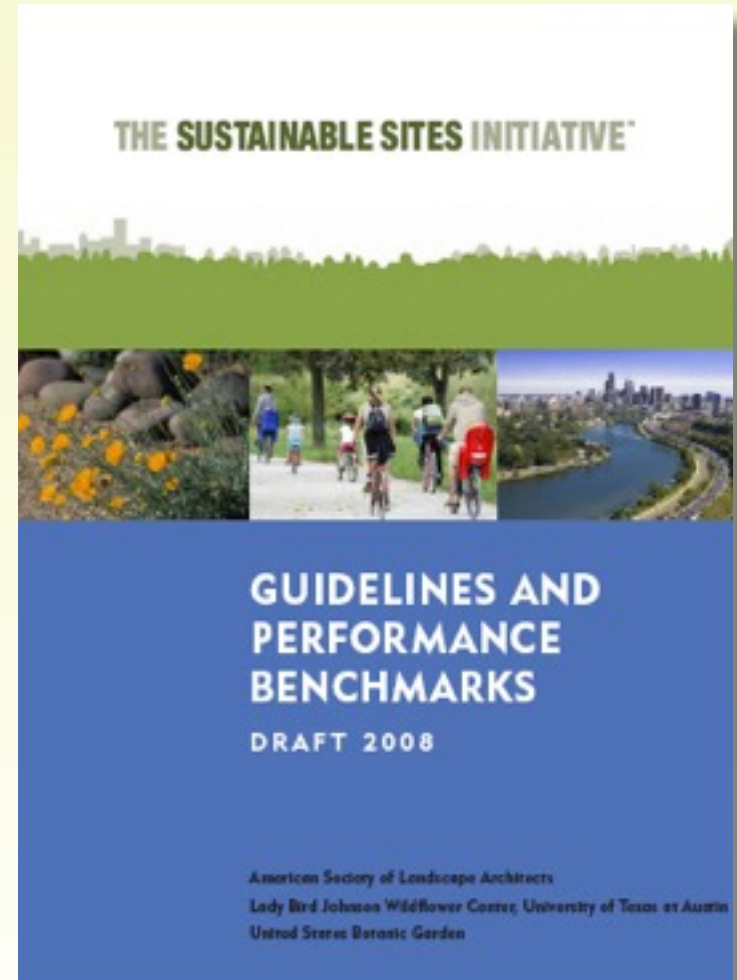
Recent developments

- LEED
  - Native vegetation

  - Low water use

Recent developments

- Sustainable Sites Initiative
  - ASLA
  - Lady Bird Johnson Wildflower Center
  - U.S. Botanic Garden

- "….to develop guidelines & standards for landscape

THE SUSTAINABLE SITES INITIATIVE

GUIDELINES AND PERFORMANCE BENCHMARKS

DRAFT 2008

American Society of Landscape Architects
Lady Bird Johnson Wildflower Center, University of Texas at Austin
United States Botanic Garden

www.sustainablesites.org

SSI guidelines and benchmarks

- Site selection

Preserve and repair

- Pre-design assessment and planning

Plan for sustainability

- Site design – ecological

Protect and restore

- Site design – human health

SSI guidelines and benchmarks

- Site selection

  Preserve and repair

- Pre-design assessment and planning

  Plan for sustainability

- Site design – ecological

  Protect and restore

- Site design – human health

- Site design – materials

  Reuse/recycle, sustainable production practices

- Construction

  Minimize effects

- Operations and maintenance

  Long-term sustainability

Sustainable urban forests

- Concept of sustainability

- Urban forest

- Criteria & indicators

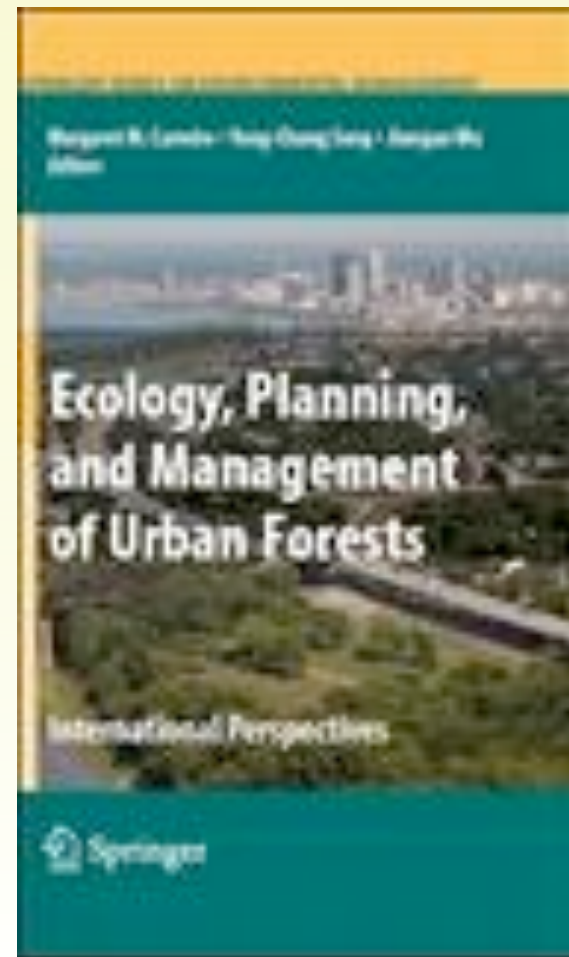- Recent research & application

Sustainable urban forest

Sustainable development

- Assessing sustainability trends…

    - Genuine savings rate

    - Approx. environmental – adjusted net domestic product

    - Eco–footprint

    - Genuine process indicator

    - Index of sustainable economic welfare

Zhang, K et al.

Sustainable urban forest

Sustainable development

- Ecocity -- An ecologically healthy city

- Ecological security
- Ecological sanitation
- Ecological industrial metabolism
- Ecoscape (ecological-landscape) integrity
- Ecological awareness

www.ecocitybuilders.org

Thursday, December 10, 2009

Sustainable urban forest

Recent developments

- LEED Canada
  - Sustainable Sites
  - Water Efficiency
  - Energy and Atmosphere
  - Materials and Resources
  - Indoor Environmental Quality

www.cagbc.org/leed/systems/index.htm